

by applying heat treatment, whereby the new oxygen precipitation nuclei are uniformly formed in the substrate, as recited in independent claim 22.

Miyashita teaches a manufacturing method for manufacturing a semiconductor substrate with a first annealing step for annealing silicon single crystal and a second annealing step for permitting oxygen embryos or oxygen precipitations to contract (Abstract). Furthermore, Miyashita teaches that “the interstitial oxygen concentration in the surface must be decreased to form a non-defective layer” (emphasis added) (column 2, lines 51-58; Figures 1A – 1C; Figure 2A), and that “the invention prevents formation of BMD (bulk micro defects) which possibly gives adverse effect to device characteristics” (column 4, lines 62-66). Miyashita later clearly teaches, in reference to Figure 2A, that in its device-forming region, the bulk micro defects 13 do not exist, but that the non-defective layer 12 is formed (column 10, lines 47-62; Figure 2A). Accordingly, Miyashita clearly teaches that the bulk micro defects 13, which corresponds to the claimed oxygen precipitation nuclei are not uniformly formed in the substrate, as is clear from Figure 2A and the above-discussed description of Figure 2A. Thus, Miyashita fails to disclose or suggest that oxygen precipitation nuclei are uniformly formed in the substrate, as recited in independent claim 22.

To qualify as prior art under 35 U.S.C. § 102, a single reference must teach, i.e., identically describe, each feature of a rejected claim. To establish *prima facie* obviousness, the applied art of record must teach or otherwise suggest each and every feature recited by the rejected claim. See M.P.E.P. §2143.03.

Thus, independent claim 22, and its dependent claims, are patentable over Miyashita. It is respectfully submitted that this argument was presented in the previous

Response, but was not addressed by the Office Action. Applicant respectfully requests that this argument be considered by the Examiner.

With respect to the rejection of the claims over Wijaranakula and Wolf, the Office Action admits that Wijaranakula fails to disclose the deposition temperature of the epitaxial layer, the oxygen concentration in units of atoms per cubic centimeter, or the substrate's resistivity, and relies on Wolf to disclose or suggest these features. However, the Office Action is mistaken for the following two reasons.

Wijaranakula teaches that in order to reach a desired result, the epitaxial layer is preferably annealed between 600° C and 900° C for preferably longer than 24 hours and up to 48 hours and 72 hours (column 5, lines 33-38). In contrast to the teaching of Wijaranakula, Wolf teaches that in order to obtain an effective annealing step, short annealing steps on the order of seconds at 650-750°C have been suggested as an effective alternative annealing step (page 61, lines 1-2). Accordingly, the teaching in Wolf, which was relied on by the Office Action to cure deficiencies in Wijaranakula, is in direct conflict with the teachings in Wijaranakula. Thus, a combination of Wolf and Wijaranakula is not proper because both references teach away from each other, and using the method taught in Wolf with the system of Wijaranakula would render Wijaranakula unsatisfactory for its intended purpose because Wijaranakula requires significantly longer annealing times in order to reach a desired result, and using the very short annealing times of Wolf would not reach that desired result. MPEP § 2143.01, Chapter V states that "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or

motivation to make the proposed modification.” Thus, combining Wijaranakula and Wolf is improper.

A closer examination of Wijaranakula reveals that the oxide microdefects 14 in the substrate 12 are not uniformly formed in the substrate, as is evidenced from an observation of Figures 2 and 3. In both these figures, it is clear that the bottom portion of the substrate 12 includes a large number of oxide microdefects 14, but the upper portion of the substrate 12, which is the “microdefect-free layer 16”, does not contain any oxide microdefects 14. Accordingly, Wijaranakula fails to disclose or suggest that the new oxygen precipitation nuclei are uniformly formed on the substrate, as recited in independent claim 22. Furthermore, Wolf fails to cure deficiencies in Wijaranakula in disclosing or rendering obvious this feature. Thus, independent claim 22, and its dependent claims, are patentable over a combination of Wijaranakula and Wolf.

For at least these reasons, none of the applied references, alone or in combination, disclose or suggest the features of independent claim 22. Claims 7-9 and 14-17 depend from claim 22. It is respectfully submitted that the dependent claims should also be deemed allowable for at least the same reason(s) for claim 22 is allowable. Accordingly, withdrawal of the rejections of the claims under 35 U.S.C. § 102(b)/103(a) and 35 U.S.C. § 103(a) is respectfully requested.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

In the event this paper is not considered to be timely filed, the Applicant hereby petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt. No. 107242-00024.**

Respectfully submitted,



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